

NIGHT DESERTION BY NESTING COMMON TERNS

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IN recent years there has been widespread nesting failure among the colonies of the Common Tern (*Sterna hirundo hirundo*) in the island region of western Lake Erie. Though the basic causes remain unknown, a very striking behavior associated with this failure has come to my attention. This is the mass night desertion of the nests by the adults as observed on Starve Island during the past three seasons.

The existence of nesting colonies on Starve and neighboring islands for many years indicates that nesting has probably been successful in the past. The extent of this success is unknown but the descriptions of Lynds Jones (1912) and E. S. Thomas (1927) indicate large colonies with many nests and chicks. A resumé (Table 1) of colony conditions, as observed by C. F. Walker and myself, is presented beyond.

During the course of this study I have received valuable aid from many associates at the F. T. Stone Laboratory. I am very grateful to all of them, especially to Dr. Charles F. Walker for his guidance and to my wife, Grace Terry Marshall, for help in preparing this paper.

The night desertion of the nests as observed on Starve Island is a group behavior phenomenon with characteristics which may be portrayed by an account of my first overnight stay there (July 3-4, 1939).

I entered my canvas blind at 7:30 P.M. The sun started to set at 8:00 P.M. (Eastern Standard Time). Nothing abnormal in nesting behavior was observed until 8:31 when a great majority of incubating terns took flight. They formed large groups, flying back and forth low over the island. As these groups of low-flying birds crossed over the water, they sometimes swooped to within a few inches of the lake level. As they flew back over the island many individual birds hovered over their nests and sometimes returned to them, though sometimes they flew on. This phenomenon lasted for about half an hour. All behavior indicated that the terns were being stimulated on the one hand to depart and on the other to incubate. Birds which had resettled to their nests often took to the air again to join flying groups passing low overhead. Such return and departure of individuals was commonly repeated several times. More and more nests were permanently deserted and the groups of low-flying birds diminished in size as terns made their departure from the vicinity of the island. The result was an almost complete absence, by 9:05 P.M., of adults either on or near the island.

I noted that no phase of this behavior resembled the flights of general alarm that are so frequent in Common Tern colonies. In these "up-flights," to use an expression employed by F. B. Kirkman (1937) in connection with the alarm flights of the Black-headed Gull, the terns fly higher and low-flying groups are lacking.

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TABLE 1
COMMON TERN COLONIES VISITED IN WESTERN LAKE ERIE *

Starve Island, Ohio	
1938: July 8 and Aug. 3	518 nests (July 8); 11+ young seen (Aug. 3) all able to fly. not necessarily raised here
1939: Repeated observations May 25-Aug. 28	1052 nests (May 25); 182 nests (July 21). Very few eggs hatched; only one chick known to survive
1940: Repeated observations May 21-June 26	295 nests (May 21); 513 nests (May 28); 257 nests, 12 chicks (June 26)
1941: Repeated observations June 15-Aug. 9	90 nests, 2 chicks (June 15); 109 nests, one chick (June 20); 64 nests, 2 chicks (July 10); no nests or young (Aug. 9)
Big Chicken Island, Ontario	
1938: July 24	179 nests, about 350 young (reported by Dale W. Jenkins)
1939: July 8 and 29	435 nests (July 8). No young seen this season; Herring Gulls nested successfully
1940: July 15	No evidence of nesting terns; Herring Gulls nested successfully
1941: July 9	No evidence of nesting terns; Herring Gulls nested successfully (remains of 64 nests still in evidence)
Big Chick Reef and Little Chicken Island, Ontario	
1939: July 8 and 29	102 nests, 2 chicks on the Reef, 163 nests on the Island (July 8). A few Double-crested Cormorants had nested successfully on the Island
1940: July 15	No evidence of nesting terns. 4 Cormorant nests on the island
1941: July 9	No evidence of nesting terns. Herring Gulls had nested successfully (remains of 8 nests on the Reef and 16 nests on the Island still in evidence)
Middle Island, Ontario	
1939: July 13	267 nests
1940: June 27	3 nests, plus evidence of additional nests that had failed
1941: July 12	No evidence of nesting terns
Fish Point, Pelee Island, Ontario	
1938: July 20	26 nests
1941: July 21	121 nests, at least 100 young in various stages of development
The Rattles (2 small islands off Rattlesnake Island), Ohio	
1939: Repeated observations July 21-Aug. 3	Nests common but young very rare
1941: Repeated observations July 5-Aug. 8	45 nests (July 5); 45 nests (July 15); 17 nests, 2 chicks (Aug. 8)

* Unless otherwise stated, no chicks were seen when the nest counts were made.

TABLE 1 (continued)

North Harbor (Island), Ontario

1939: July 12	26 nests
1941: July 9	18 nests

Middle Sister (Island), Ontario

1941: July 1	56 nests
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Detached Rocks Bordering Green Island, Ohio

1938: July 13	33 nests
1940: Repeated observations throughout breeding season	18 nests (July 8). No young seen on late July and early August visits
1941: Repeated observations throughout breeding season	14 nests (June 27); 14 nests (July 15); no nests or young (July 31)

Lost Ballast Island, Ohio

1938: July 31	Evidence that a small colony (10-30 nesting pairs) had failed
1940: June 22	One nest, 2 chicks
1941: July 5	No evidence of nesting terns

From 9:12 to 9:35 I flushed four adult terns, the only birds found remaining on the island. During the night isolated calls were heard from individual birds but none returned. It was a bright moonlight night with moderate winds. The minimum temperature recorded at the Stone Laboratory, a straight line distance of $2\frac{1}{8}$ miles from Starve Island, was 70° F.

The first vague signs of dawn came at 3:50 A.M. At 3:55 large, noisy groups of terns commenced to fly low over the water near the island. Soon they flew back and forth over their nests. Many hovered above their nests and eventually alighted. These alighting birds, however, usually returned to the flying groups again, often repeating this several times before settling to normal incubation. The return of the birds in many ways resembled their departure behavior executed in reverse order. At 4:40 this return behavior seemed complete and normal incubation was in progress. Sunrise probably occurred about 5:00 A.M. but the exact time was obscured by clouds.

In the 1939 breeding season I also observed night behavior on Starve Island July 11-12 and 21-22 and the same desertion was found to occur. The departure on July 21 was witnessed from a boat floating 100 yards to the lee of the island, and thus a check was made against the possibility that desertion behavior had been due to my presence. Desertion by the terns nesting on the Rattles, two small islands adjacent to one another, was also ascertained by the absence of adults when we arrived there at 9:15 P.M. on July 21.

During this same season we made attempts to trace the night movements of the Starve Island terns but, although we found that they

vacated the immediate vicinity of the island and we even followed some groups by boat approximately 8 miles from the breeding colony, we learned nothing conclusive about where and how they spend the night.

In 1940, observations were begun earlier in the season. Attempts to study night behavior at Starve Island on May 25-26 and 28-29 yielded confusing results. The terns did not depart at twilight in either instance. On May 25 the terns were flushed by my activities at 9:10 P.M. and did not return (probably until dawn, but I did not stay to prove this). On May 28-29 the colony was not deserted till sometime after 1:00 A.M. and the terns did not return till early dawn at 3:50 A.M. I made another observation by arriving at Starve at 3:00 A.M. on June 1. At that time the terns were present and incubating normally. My arrival caused immediate desertion but the terns returned at the earliest signs of dawn. Later in the season, on June 12-13, 14-15, and 21-22, I noted unquestionable instances of night desertion at Starve Island. The behavior observed on June 12 and June 21 showed that birds do not always follow the set pattern of departure described for July 3, 1939, but may simply desert their nests one by one during the early hours of darkness. On the other hand, I have never found any variation in the early morning arrival behavior. Desertion occurring on June 14-15 was demonstrated by arriving at the island at 3:00 A.M. and finding the colony vacated, a fact which further supports my conviction that desertion is not the result of human intervention.

Visiting the colony in the early morning has proven to be the most practical method of observation. It involved arriving about a half hour before the earliest signs of dawn (about 3:15 A.M.). In the colonies studied, the unconcealed investigator arriving at that hour always caused desertion by whatever terns remained. However, such desertion was not effective for much more than a half hour because deserting terns consistently returned at dawn. Though such a procedure does not enable one to study the nature of the departure behavior, I confined my observations to this method in 1941. Early morning trips to Starve Island on June 20 and July 9 and to the Rattles and Green Island colonies on July 15 showed that, with a few exceptions, the nests had been deserted on these nights.

Even when the great majority of adults desert, a few often remain and continue to incubate. On June 15, 1940, I recorded the temperature of one of these attended nests a few minutes after the adult had been flushed. It was slightly above 80° F., while the temperature of the air and of four deserted nests was 65° F. Night desertion may have exposed the eggs to temperature much lower than this. However, for the dates on which desertion was ascertained, 62° F. (for June 21-22, 1940) is the lowest temperature recorded. Using data presented by R. A. Huggins (1941), one can compare the above temperatures with those normally maintained by the incubating Common Tern, as studied during the daytime. He records an average egg temperature of 96.3° F.

for four nests, while the average air temperature during the four trials involved, each of which lasted six hours, was 82.4° F. The lowest egg temperature recorded by Huggins for the Common Tern is 85.5° F.

It has never been my privilege to observe a successful Common Tern colony during the dark hours and I have found no published accounts of normal night behavior. E. S. Thomas (1927) describes an instance of night desertion about July 22 while his party was actively banding terns at Starve Island. There were some nests present but at this late date most of the young were in the "flapper" stage. Social flights at twilight as displayed by the Common Tern (*Sterna h. hirundo*), the Little Tern (*Sterna a. albifrons*), and the Sandwich Tern (*Sterna s. sandvicensis*) are described by Friedrich Goethe (1939), and M.B. Trautman (1939) adds the Black Tern (*Chlidonias nigra surinamensis*) as another exhibiting an evening behavior pattern of this general nature during the breeding season. Both H. L. Ward (1906) and R. M. Strong (1914) give accounts of comparative inattentiveness of Herring Gulls (*Larus argentatus*) toward their young during the dark hours of the night but these adults did not forsake the general neighborhood.

For information on the night behavior of the Common Tern in successful colonies, I am grateful to Dr. Charles E. Doe, Department of Ornithology, University of Florida, and to Mr. Charles B. Floyd, Secretary of the Northeastern Bird-Banding Association, both of whom have had extensive experience in Cape Cod tern colonies during the hours in question. They have found the Common Tern to be a tenacious incubator during the night, even when the birds were frightened repeatedly by the activities of men in the vicinity.

It is difficult to conceive of predation as a cause for this desertion and nesting failure because of the nature of the behavior involved and because no likely predators are known. The water snake (*Natrix sipedon insularum*) has been common in prosperous tern years as well and there is no evidence that it feeds on eggs or young. I have not seen any mammals, not even rats, on Starve Island. I have observed the Black-crowned Night Heron (*Nycticorax nycticorax*), a species becoming increasingly abundant in western Lake Erie, eating the eggs from unattended nests during the night but I have also seen this bird quickly retreating from the attacks of the defending terns when the colony is well attended. Though Herring Gulls have been nesting in increasing numbers on the Chicken Islands in the past few years, they have not nested on Starve Island and observations yield no evidence that they disturb the terns there.

During the past two years I have kept records of the fish carried to the island in the bills of Common Terns. Such food was composed almost entirely of cyprinids. The most abundant of these, the Lake Shiner (*Notropis atherinoides*), was also found by C. G. Manuel (1931)

to be the most abundant fish in the diet of these terns when he studied their food habits on Saginaw Bay, Lake Huron. It seems probable that an insufficient or a comparatively inaccessible food supply would disrupt nesting activities, as was suggested by O. S. Pettingill (1939) with regard to failures observed in a colony of Arctic Terns (*Sterna paradisaca*). However, it is not possible, at present, to judge whether or not the dietary requirements for normal incubation are adequately met in the waters about these failing colonies.

I doubt whether either adverse weather or human intervention is a factor in the general failure of these colonies. R. S. Palmer's (1938) discussion of severe weather conditions as being disastrous to tern nesting along the Maine coast may have wide application but, during the four years included in this present study, I have observed many cases of failure under what appeared to be ideal meteorological conditions. Similarly, colonies considered, from repeated observations throughout the breeding season, to be quite free from human disturbances have been failures, while, in contrast to this, there is some evidence that terns prospered back in the days when the people of the region made it a practice to collect the eggs for food.

I have been unable to detect anything unusual in the daytime attentiveness of the terns at Starve Island at any time during the nesting season. Adults exchange places at the nest at frequent but irregular intervals. I have noted that sometimes a tern incubates for only a moment; sometimes for well over an hour. It may be quite normal, in the face of certain (in this case unrecognized) adverse conditions, for night incubation to relax even though daytime attentiveness continues. Perhaps this becomes increasingly true as the season progresses. There is evidence that in its earliest form this nest desertion is executed by individuals and later develops into the striking group behavior described, a development which would correlate with the statement made by Palmer (1941, pp. 107, 108) to the effect that "social behavior is most restricted when territories are first defended, but gradually occupies more time from egg-laying onward."

From the records of an extensive banding program at Cape Cod, O. L. Austin, Sr. (1940, p. 160) states that "a successful tern colony is built around an essential nucleus of sexually efficient individuals between four and ten years of age," and he has taken breeding birds as old as sixteen years. Knowledge of such a breeding span enables one to understand this species' ability to continue despite unsuccessful nesting attempts. However, if the conditions described for Starve Island continue and occur in the neighboring colonies, the island region of western Lake Erie cannot be considered a satisfactory breeding area for the Common Tern.

SUMMARY

Night desertion of their nests, a behavior frequently initiated by a distinctive group flight at twilight and lasting till dawn, has been ob-

served on the part of the Common Terns comprising the breeding colony at Starve Island in western Lake Erie. The underlying causes for this lapse in attentiveness, which has been studied during the past three breeding seasons, are as yet unknown. Accompanying it there have been repeated, complete nesting failures, contrasting with reports of past successes.

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